

538,947

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
1 July 2004 (01.07.2004)

PCT

(10) International Publication Number  
**WO 2004/055718 A1**

(51) International Patent Classification<sup>7</sup>: **G06K 9/62**

(21) International Application Number:  
**PCT/GB2003/005285**

(22) International Filing Date: 4 December 2003 (04.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0229473.4 18 December 2002 (18.12.2002) GB

(71) Applicant (for all designated States except US): **QINETIQ LIMITED [GB/GB]**; Registered Office, 85 Buckingham Gate, London SW1E 6PD (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SPENCE, Geoffrey**

[GB/GB]; QinetiQ Limited, Malvern Technology Centre, E building Room 510, St Andrews Road, Malvern, Worcs. WR14 3PS (GB). **CLARKE, Ira, James [GB/GB]**; Little Cleveland Farm, Little Cleveland, Malvern, Worcs WR13 6PE (GB).

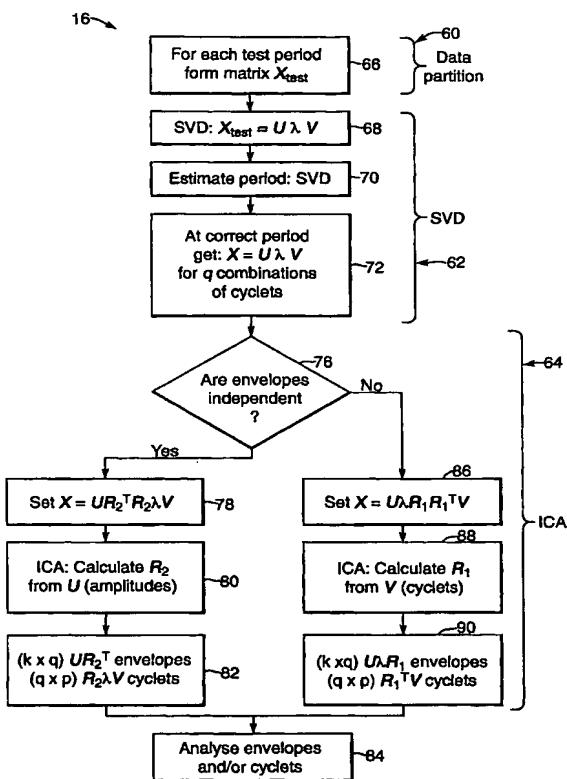
(74) Agent: **WILLIAMS, A., W., S.; IP Qinetiq Fromalities, Cody Technology Park, A4 Building, Room G016, Ively Road, Farnborough, Hampshire GU14 0LX (GB).**

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),

*[Continued on next page]*

## (54) Title: SIGNAL SEPARATION



(57) Abstract: A signal separation method (16) for separation of source signals from a composite signal (104) expresses the composite signal (104) as a series of values of signal amplitude. The source signals have periodicities similar or equal to  $p$ . The composite signal (104) is partitioned into sections which provide respective rows of a matrix  $X$ , in which successive rows represent successive sections. A singular value decomposition of the matrix  $X$  is performed to obtain two singular vector matrices  $U, V$  and a singular value matrix  $\lambda$ . An independent component analysis is performed on one of the singular vector matrices  $U, V$  to obtain an independent component matrix  $UR_2^T, R_1^TV$  and an associated component matrix  $R_2\lambda V, U\lambda R_1$ . One of the component matrices  $UR_2^T, U\lambda R_1$  contains estimated separated signal modulation envelopes and the other component matrix  $R_2\lambda V, R_1^TV$  contains estimated separated cyclets.

WO 2004/055718 A1